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ABSTRACT

This study was designed to answer two questions: Will the percentage of utility for a group of phonic generalizations in a college-level vocabulary sample be similar to generalizations in a primary-level sample? Will qualitative differences in the types of phonic generalizations be apparent? A 1,495-word sample was selected from George Feinstein's "Programmed College Vocabulary 3600"; Clymer's original list of 45 phonic generalizations was adapted for use in the study and formed the basis for a measure of utility for word pronunciation. The following changes were evaluated for their effects on results: lowering the percentage of utility, prorating the length of the study, and using the separate pronunciation of word parts, in addition to phonic generalizations. It was concluded that phonic generalizations had a lower degree of utility when applied to a college-level vocabulary sample than when applied to a primary-level vocabulary sample. However, generalizations demonstrated a similar degree of utility when applied to a college-level sample and to a sample that was beyond primary level. Tabulations of data and Clymer's list of phonic generalizations are included. (Author/KS)

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UTILITY OF PHONIC GENERALIZATIONS AT THE COLLEGE LEVEL

A THESIS

SUBMITTED TO THE FACULTY

OF THE GRADUATE SCHOOL OF EDUCATION

OF

RUTGERS

THE STATE UNIVERSITY OF NEW JERSEY

BY

ALAN C. BIERI

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REQUIREMENTS FOR THE DEGREE

OF

MASTER OF EDUCATION

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ABSTRACT

Problem

Two main problems were of concern in this study:

1. Will the percentage of utility for a group of phonic generalizations applied to a college level vocabulary sample be similar to phonic generalizations obtained when applied to a primary level vocabulary sample and a beyond a primary level vocabulary sample?

2. Will there be qualitative differences in the types of phonic generalizations.

Procedure

A word sample of 1,495 words was selected from George Feinstein's Programed College Vocabulary 3600. Clymer's original list of 45 phonic generalizations, less two generalizations that necessitated knowing whether the word was accented on the proper syllable, were used in this study.

After each word had been checked in Webster's New Collegiate Dictionary (1959) as to its correct pronunciation, accentuation and syllabication, two lists were compiled for each generalization. The first list contained the words that conformed to the generalization while the second list contained the

exceptions. A percentage of utility was then obtained for each generalization by dividing the total number of words conforming to the generalization by the total number of words that it should apply to. If a generalization had 75% utility and applied to 20 words it was considered "useful."

After comparisons with Clymer's (1963) study and Emans' (1967) study, the following changes were analyzed as to their effect on the results:

1. Lowering the percentage of utility from 75% to 60%.
2. Prorating the length of the study to insure its comparability with other studies.
3. Use of the separate pronunciation of word parts in addition to the phonic generalizations.

Results

The following results were obtained:

1. Fifteen of Clymer's phonic generalizations were found to have met the original criteria for "usefulness," which was that the generalization apply to at least 20 words and that it predict the pronunciation of the word at 75% of the time.

2. Seven of Clymer's generalizations that were "useful" at the primary level were not found to be "useful" at the college level.
3. Two of Emans' generalizations that were "useful" at the beyond primary level were not found to be "useful" at the college level.
4. Four of the 15 generalizations that were found "useful" at the college level were not identified as "useful" at the primary level. Fourteen of these 15 were also found "useful" at the beyond primary level.
5. Lowering the percentage of utility produced three more phonic generalizations that met the criteria of "usefulness" at the college level.
6. In prorating the length of this study to be comparable to the primary level study, no new phonic generalizations were noted that would have met the criteria of "usefulness."
7. The use of a separate pronunciation for word parts in addition to the phonic generalization did not produce any new phonic generalizations that met the criteria of "usefulness."

Conclusions

Phonic generalizations had a lower degree of utility when applied to a college level vocabulary sample than when applied to a primary level vocabulary sample. However, phonic generalizations demonstrated a similar degree of utility when applied to both a college level and beyond primary level vocabulary sample.

Qualitatively, the difference between this study and Clymer's (1963) study was an insufficient number of words occurring to which certain phonic generalizations should be applied. The small difference between this study and Emans' (1967) study was one phonic generalization that had a high enough percentage of utility but an insufficient number of words.

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TABLE OF CONTENTS

	Page
ACKNOWLEDGMENTS	ii
LIST OF TABLES	iv
Chapter	
I. INTRODUCTION	1
The Problem	2
Importance of the Study	3
Definition of Terms	4
Limitations of the Study	4
II. REVIEW OF THE LITERATURE	7
Phonetic Regularity	7
Utility of Phonics Generalizations	10
Summary	14
III. PROCEDURE	15
Materials of the Study	15
Method of Analysis	16
IV. FINDINGS AND DISCUSSION	19
Findings	19
Discussion	37
V. SUMMARY AND CONCLUSIONS	47
Summary	47
Conclusions	49
BIBLIOGRAPHY	51
APPENDIX A - SUPPLEMENTARY FIGURES	54

LIST OF TABLES

Table		Page
1.	Utility of Phonic Generalizations on Words Found in a College Level Vocabulary Program	20
2.	Comparison of the Utility Levels of Phonic Generalizations from Primary to College Level with Identification of Those Meeting Established Criteria of Usefulness	24
3.	Total Number of Words That Each Generalization Applies to for Each Vocabulary Level from Primary to College	28
4.	Comparison of the Utility Level of Phonic Generalizations from Primary to College Level with Identification of Those Meeting Established Criteria of Usefulness . . .	32
5.	Comparison of the Utility of Phonic Generalizations Used by Themselves and When Used with a Specific Pronunciation for Words with Greek or Latin Roots or Prefixes	36
6.	Frequency of Occurrence of Each Phonic Generalization in College Level Vocabulary Sample and Projected Number of Words Occurring if the Study Contained the Same Number of Words that Clymer Used (2600)	38

CHAPTER I

INTRODUCTION

Many members of our population who are considered poor readers suffer from inadequate word recognition skills. Word recognition skills are those methods by which the reader identifies, pronounces, recalls and finally reads each word that is presented graphically (Spache, 1973). The methods used for decoding unknown words include phonic analysis, structural analysis, syllabic word attack and contextual analysis (Wallen, 1969).

Over the years reading failures have been attributed to programs where no phonic analysis was taught, poor phonic instruction was given and too much phonic instruction was given. Some experts have advocated phonics as the only technique for word recognition and also as the cure for the many high school students who cannot read unknown words (Karlin, 1964). Studies by Bailey (1967), Burmeister (1968), Clymer (1963) and Emans (1967) on the applicability of phonic generalizations to primary and middle grade vocabularies have given us information

concerning the usefulness of certain rules that are being taught in our schools today. However, confusion exists as to the value of certain phonic generalizations that may have a limited value for instructional purposes (Clymer, 1963). This study will attempt to shed some light on the question of whether research done on primary grade reading vocabularies is applicable to that of the college level reading, where the reader has more opportunity to apply principles of word structure to the unknown word (Gagon, 1966). A distinct need exists for identifying phonic generalizations that apply equally as well to phonetic elements in all parts of multi-syllabic words (Davis, 1972).

The Problem

Two main problems were of concern in this study:

1. Will the percentage of utility for a group of phonic generalizations applied to a college level vocabulary sample be similar to phonic generalizations obtained when applied to a primary level vocabulary sample and a beyond a primary level vocabulary sample? Two related specific questions bear on this problem: a. The effect of changing the cut-off point from

75% to 60% and b. The effect of prorating the length of the study and its comparability to other studies.

2. Will there be qualitative differences in the types of phonic generalizations? More specifically, what is the relationship between phonic generalizations and word parts?

Importance of the Study

Vocabulary improvement must depend in part upon the word recognition skills that the student possesses. Students of all ages use various methods in order to independently decode unknown words when they encounter them in their reading. Phonic analysis is one such method which is usually taught during the first three years of schooling.

Studies have been done in order to find how useful these phonic generalizations are when applied to particular grade level vocabularies. Many of the studies have questioned the applicability of these generalizations when applied to higher level vocabularies due to the presence of polysyllabic words. This study attempts to discover the utility of these phonic generalizations when applied to a college level vocabulary sample in a programmed text.

Definition of Terms

Phonics generalization was defined as a rule that explained a particular sound-symbol relationship as it occurred in words in the English language. The generalizations that were used are presented in Appendix A.

Utility was defined as the percentage of usefulness that a particular phonic generalization has when applied to the vocabulary sample.

College level was defined here to mean freshmen in college.

Programed text was defined as Programed College Vocabulary 3600.

Limitations of the Study

The limitations of the study included the following points:

1. The vocabulary sample selected may not have accurately represented the typical college level vocabulary that a student encounters in college.
    a. The sampling from the various disciplines may not reflect the proper

proportion for the average incoming student.

b. The pronunciation differences may be specific to the geographic area in which the author resided and therefore its transferability to this part of the country may not be valid.

2. The dictionary pronunciations obtained from Webster's New Collegiate Dictionary may differ from those that would be obtained from another dictionary.
3. The relatively small sample of words studied may have restricted the occurrences of enough examples of certain generalizations to prevent acceptance of a generalization being termed useful. At least 20 occurrences of a particular rule was set as part of the determination of its usefulness.
4. Setting a figure of 75% applicability as the other determining factor of usefulness may be a too high or a too low percentage to identify its value to students.

5. The phonic generalizations that met the original criteria of 75% utility and 20 occurrences in this college level vocabulary sample may not meet the established criteria with another college level vocabulary sample due to the problem of generalizing to other language samples (Clark, 1973).

CHAPTER II

REVIEW OF THE LITERATURE

The review of the literature was organized to provide some answers to the following questions:

1. What is the phonetic regularity of the English language?
2. Are phonic generalizations really that useful when applied to unknown words?

Phonetic Regularity

The use of a phonics approach to teaching reading must, by necessity, be founded upon the phonetic regularity of the English language. Depending on the study referred to, the number of rules considered regular, and dialect spoken, the range of phonetic regularity runs from about 50% to above 90% (Fry, 1972).

In early studies reviewed by Spache (1939), he concluded that 89% of the monosyllables in the English language were phonetic in their spellings. He also pointed out that Gates had found that our 13 vowel sounds could be written in 104 different ways.

Armstrong (1949) determined that the 26 letters of the alphabet could produce at least 117 sounds.

A study by Hanna and Moore (1953) of 3000 of the highest frequency words used by students in writing, reading, and speaking produced the following results: 80% of the phonemes were represented by their regular spelling, 75% of the vowel phonemes were represented by their regular spelling, and 82% of the consonant blends and speech sounds had only one spelling.

There were 22 different ways to spell the short i as in hit (Horn, 1954).

Only 200 of the 350 commonest words can be written as they sound (Hildreth, 1958).

Anderson (1964) stated that he found 300 different combinations that can be used to express the 17 vowel sounds in the English language.

A large scale research project begun in 1962 at Stanford University sought to examine the phoneme-grapheme relationship of 17,000 words through the use of a computer. The results of this project are reported in two stages. Hanna, Hanna, Bergquist, Hodges and Rudorf (1965) summed up their findings as follows:

> The computations derived from this analysis showed that individual phonemes are represented by predictable grapheme options more than 80 percent of the time when these two conditions of position and stress were taken

into account.

> A second phase of the Stanford University project then directed a computer to spell from phonemic cues 17,000 words in the selected sample on the basis of rules derived from the first analysis with the added factor of including the effects of surrounding phoneme-grapheme correspondences upon how particular phonemes are spelled in standard practice. The results: 89.6 percent of the individual phonemes in the sample were correctly spelled. However, only 49 percent of the words in the sample were correctly spelled. (p. 862)

Some linguists have agreed that the relationship between written English and spoken English was not very strong in relating individual letters and sounds, but that the correspondence was considerably higher when the graphemic unit was letter patterns and word groups (Bloomfield, 1942; Keisler, 1964).

Ross (1967) believed that the English language was much more regular than it had previously been supposed, especially when all the phonological generalizations, the syntax and the morphemes were considered. These have provided a significant amount of help for the learner in mastering the language.

A method of phonics instruction had been suggested that would require the student to learn more than one associated sound to letter generalization, so that he could be flexible in trying out one possibility and then another until recognition took place (Levin, 1966; Emans, 1967).

The problem that the English language presents is most clearly stated by Fry (1972), Harris and Smith (1972), and Heilman (1968). Our alphabet only offers 26 letters which have had to be used to represent anywhere from 39 to 44 distinctive speech sounds.

Utility of Phonics Generalizations

In the early research on language reviewed by Gagon (1966) he noted that most of the early research by Atkins (1926, Cordts (1925), Vogel (1923), and Washburne (1928) was concerned with the relative frequency of phonograms and letter sounds in representative vocabulary lists. There was no general agreement as to the values of any particular set of rules concerning vowels.

In analyzing data concerning the accuracy with which a particular vowel generalization helped in pronouncing the new word, Oaks (1952) enumerated eight vowel principles which were usable in 50% of the vowel situations that occurred in the primary grades.

Clymer (1963), tested 45 generalizations derived from four basal readers that were being used in the primary grades. Only 18 rules met the criteria that he established of 75% accuracy in pronunciation with an occurrence of 20 times in the total vocabulary studied. Only six of the 24 generalizations that

related to vowel principles met his measure of utility.

Burrows and Lourie (1963) conducted a study on the phonic generalizations of two vowels together by analyzing 5,000 words of the highest frequency on the Rinsland list. They found that only 668 of the 1,728 words that contained two adjacent vowels were pronounced as the phonic generalization specified.

Bailey (1965) analyzed phonic generalizations as they applied to 5,773 words in textbooks for first through sixth grade. She found only six generalizations worthwhile to teach from the list of 45 developed by Clymer (1963).

Emans (1967) studied the utility of Clymer's (1963) generalizations as they applied to a vocabulary of 1,944 words taken from the Teacher's Word Book of 30,000 words beyond the primary level. He stated:

> We found 16 generalizations meeting criteria used by Clymer. Although 13 generalizations demonstrated their usefulness in both studies, four or possibly five of those which proved useful on the primary level failed in usefulness for words beyond the primary level; and conversely, three of those generalizations which were judged not useful at the primary level were judged useful for words beyond the primary level.

The usefulness of phonic generalizations is also relevant to ability of students to spell correctly. Six selected spelling programs containing 5,431 words

were analyzed according to the generalizations identified by Clymer (1963). Davis (1969) found that nine generalizations showed 100% applicability while 17 more ranged from 77 to 98 in their percentage of utility.

Affleck (1969) inspected the first 6,000 words in the Thorndike-Lorge Teacher's Word Book in order to determine the usefulness of six vowel generalizations when applied to the vocabulary of fourth, fifth, and sixth grade level. She analyzed a total of 19,400 syllables and concluded:

> Although the data did not indicate any considerable increases in the percentage of utility of vowel principles when applied to a vocabulary for intermediate grades, it did show that the utility of these principles, which are commonly taught at the primary grade levels, was maintained at the intermediate grade levels. Percentages in every case, were higher for application of all principles to total accented syllables and to all syllables in the intermediate grade vocabulary than those reported for the primary grades.

Most of the studies that have been done concerning phonic generalizations use frequency controlled basal readers from which they draw the vocabulary to be analyzed. Dzama (1975) chose to analyze a sample of 2,025 words derived from 225 first-grader sight vocabularies. She used the same criteria as Clymer (1963) and found that all 18 generalizations that were useful in his study were, in fact, still acceptable plus two more that were previously not found.

Studies by Bailey (1965, Burmeister (1966), Clymer (1963), Emans (1966), Oaks (1952) and Winkley (1966) were summarized and reported by Burmeister (1968). Her comments are applicable even to studies done since she wrote her report. Her interpretation of the previous studies was summed up as follows:

> Apparently the variation in the sources from which sample words were selected makes very little difference in the findings. This becomes obvious when one compares the findings of Clymer, Bailey, and Emans in particular. When the size of the sample is large, the "utility" levels of almost all generalizations are fairly standard.

A new way to look at the value of phonic generalizations was suggested by Bukovec (1973). He underscored that phonic generalizations should be analyzed according to their ability to help the student recognize the word and not solely on the basis of calling forth an accurate pronunciation. He emphasized that a partially accurate pronunciation along with contextual clues is often enough to enable the student to figure out the right word. He thought that by terming a generalization not useful because it did not produce an accurate pronunciation 75% of the time, information that might allow the student to mispronounce the word initially and then recognize what word is intended by the context given would be disregarded.

Summary

The majority of the studies reviewed indicated that due to the phonetic regularity of the English language when looked at from the standpoint of letter patterns and syllables, knowledge of their sounds would be beneficial in decoding an unknown word. Just how important these phonic generalizations are to the older student, who probably relies on contextual and structural analysis, is not clearly defined due to the lack of research done on multisyllabic words. This research was done in order to determine the value of phonic generalizations to the college student who has had problems with word recognition.

CHAPTER III

PROCEDURE

The study on the relative usefulness of a phonic generalization's ability to correctly provide the proper pronunciation of words in a college level text, Programed College Vocabulary 3600, was begun in November 1975. The textbook chosen was used in the Learning Center of Newark College of Arts and Sciences and by the investigator for a reading course being taught through University College for the Spring 1976 semester. The phonic generalizations investigated were those originally suggested by Theodore Clymer (1963).

Materials of the Study

Clymer's (1963) original list of 45 phonic generalizations, less two generalizations that necessitated knowing whether the word was accented on the proper syllable, were used in this study. The reason for eliminating Clymer's original #33 and #34 generalizations was that the student needed to pronounce the word first, then apply the generalization. This meant that the rule did not assist him pronouncing

an unknown word, but only helped him after he had already pronounced it.

Appendix A gives the complete list of the phonic generalizations used by Clymer (1963).

The sample college level vocabulary used in this study was chosen from a textbook Programed College Vocabulary 3600 by George W. Feinstein of Pasadena City College. This textbook was intended to supplement freshmen English. The text focused on the literary and academic terms needed to provide the necessary vocabulary for first year students.

The word sample in this study was derived from the actual vocabulary words introduced in the text. The 3600 mentioned in the title of the book referred to the number of active responses that it elicited from the student, and not the total number of words introduced in the text. A total of 1,495 words were studied. The following 5 categories (an example in parentheses) were eliminated: foreign words (Rainsonneur), phrases (comedy of humors), place names (Valhalla), names of persons (Babbit), and adjectives derived from proper names (Falstaffian).

Method of Analysis

As in Clymer's (1963) study, each of the words selected from the sample vocabulary was checked in

Webster's New Collegiate Dictionary (1959) as to its correct pronunciation, accentuation and syllabication. Following this procedure, two lists of words were compiled for each generalization. The first list contained the words which conformed to generalizations being applied while the second included the exceptions to the rule.

Following the compilation of the 43 lists of examples and exceptions, the relative utility of each generalization was determined. As established by Clymer's (1963) study, the percentage of utility was computed by dividing the number of words conforming to the generalization by the total number of words that the generalization should apply to. This figure was considered the percentage of utility. The second determinant of usefulness was to see if the word list contained at least 20 words to which the generalization could apply. At least 20 occurrences and 75% utility of the rule meant sufficient utility for Clymer.

Each of the phonic generalizations and the word lists that accompanied it were then studied to see if any of the following conditions might appreciably change the number of generalizations having utility. The first proposed change was that

of lowering the percentage of utility to 60%, as several other researchers have questioned the 75% figure as possibly being too high. The second condition was concerning words of multiple syllables where parts of the words have specific pronunciations such as Greek and Latin roots and prefixes. The third situation to be analyzed was whether the relatively small sample studied prevented enough occurrences of a particular generalization to label it useful. Would a larger sample have provided the necessary words in the proportion found in this study to meet the criteria for the number of occurrences?

CHAPTER IV

FINDINGS AND DISCUSSION

The primary concern of the analysis of data was to examine differences between the utility of phonic generalizations at the primary level, at the beyond the primary level, and at the college level. A secondary purpose was to observe the changes in the number of generalizations meeting the criteria for utility when the following were applied. The first change was lowering the percentage of utility to 60%. The second was knowledge of parts of words such as Greek and Latin roots and prefixes and their specific pronunciation. The third was concerned with the relative size of the sample preventing the occurrence of enough words to qualify for utility. The data, supporting material and discussion follow.

Findings

Clymer's Generalizations Applied to a College Vocabulary Sample

Each phonic generalization was applied to each word in which it occurred to see if it was pronounced as the generalization claimed it should be. Table 1

TABLE 1

UTILITY OF PHONIC GENERALIZATIONS ON WORDS FOUND IN A COLLEGE LEVEL VOCABULARY PROGRAM

Generalization	Number of Conforming Words (Example)	Number of Exceptions (Example)	Percent Utility
1	28 (impeach)	408 (audience)	6
2[a]	20 (bland)	5 (droll)	80
3	0	0	0
4	14 (scribe)	11 (stance)	56
5[a]	342 (perfidy)	96 (portable)	78
6	16 (malaise)	39 (clairvoyance)	29
7	2 (lien)	10 (orient)	30
8	4 (creed)	2 (veer)	66
9	105 (graphite)	53 (novice)	66
10	1 (soothsayer)	1 (picayune)	50
11	2 (sprightly)	0	100
12	0	2	0
13	0	0	0
14	1 (callow)	1 (browbeat)	50
15	1 (callow)	1 (browbeat)	50
16[a]	185 (annuity)	3 (deploy)	98
17	67 (magnify)	194 (auditory)	25
18	32 (automat)	86 (localism)	27
19	0	0	0
20[a]	50 (chornic)	1 (schism)	98
21	9 (impeach)	42 (matriarch)	17

TABLE 1 (Continued)

Generalization	Number of Conforming Words (Example)	Number of Exceptions (Example)	Percent Utility
22[a]	94 (century)	13 (artificial)	87
23[a]	143 (aquacade)	0	100
24[a]	54 (portage)	4 (malinger)	93
25	2 (benighted)	0	100
26	0	0	0
27	0	0	0
28[a]	142 (annual)	6 (immoral)	95
29	2 (flashback)	0	100
30[a]	25 (caption)	77 (predict)	76
31[a]	117 (belabor)	18 (deify)	86
32	9 (irony)	1 (imply)	90
33	-	-	-
34	-	-	-
35	6 (signature)	0	100
36[a]	60 (motivation)	0	100
37	111 (renovate)	71 (credence)	60
38[a]	98 (terrain)	2 (gullible)	98
39	302 (locus)	351 (spirit)	46
40[a]	53 (manacle)	8 (simile)	86
41[a]	33 (atheism)	0	100

TABLE 1 (Continued)

Generalization	Number of Conforming Words (Example)	Number of Exceptions (Example)	Percent Utility
42	27 (equivocal)	48 (abbreviate)	36
43	16 (brash)	6 (tort)	72
44	2 (sect)	0	100
45[a]	63 (epicenter)	3 (inter)	95

[a]Generalizations which met the original criteria of 75% utility and 20 occurrences.

lists the percentage of utility found for every generalization, except numbers 33 and 34. These two required pronunciation by the subject before the rule could be used and for this reason they were not studied. The percentage of utility was simply the number of words that can be correctly pronounced by use of the rule, divided by the total number that the rule applied to directly. Table 1 also includes a word in parentheses which was either an acceptable word or an exception to each generalization that was studied. Generalizations 2, 5, 16, 20, 22, 23, 24, 28, 30, 31, 36, 38, 40, 41, and 45 met Clymer's original criteria of 20 occurrences and 75% utility and were considered "useful."

Comparison of the Percentage Utility in Primary, Beyond Primary and College Level Vocabulary Sample

Table 2 illustrates the changes in applicability of phonic generalizations as applied from primary to the college level vocabulary. The percentages of utility which met both stipulations concerning "usefulness" are indicated by a. A total of 11 generalizations (5, 16, 20, 22, 23, 28, 30, 31, 40, 41, 45) had sufficient utility and frequency of occurrence to be identified as "useful" at all three vocabulary levels. Several generalizations (8, 10, 21, 25, 29, 32, 44) were

TABLE 2

COMPARISON OF THE UTILITY LEVELS OF PHONIC GENERALIZATIONS FROM PRIMARY TO COLLEGE LEVEL WITH IDENTIFICATION OF THOSE MEETING ESTABLISHED CRITERIA OF USEFULNESS

Generalization	Clymer 1963 Primary	Emans 1967 Beyond Primary	Bieri 1976 College
1	46%	18%	6%
2	62%	73%	80%[a]
3	74%	33%	0%
4	63%	63%	56%
5	78%[a]	82%[a]	78%[a]
6	66%	58%	29%
7	17%	23%	30%
8	98%[a]	100%[a]	66%
9	60%	48%	66%
10	78%[a]	100%	50%
11	71%	100%	100%
12	32%	28%	0%
13	35%	14%	0%
14	59%	50%	50%
15	40%	31%	50%
16	84%[a]	98%[a]	98%[a]
17	15%	4%	25%
18	48%	24%	27%
19	90%	100%	0%
20	100%[a]	100%[a]	98%[a]

TABLE 2 (Continued)

Generalization	Clymer 1963 Primary	Emans 1967 Beyond Primary	Bieri 1976 College
21	95%[a]	67%[a]	17%[a]
22	96%[a]	90%[a]	87%[a]
23	100%[a]	100%[a]	100%[a]
24	64%	80%[a]	93%[a]
25	100%[a]	100%	100%
26	100%	100%	0%
27	100%	100%	0%
28	99%[a]	91%[a]	95%[a]
29	100%[a]	100%	100%
30	85%[a]	75%[a]	76%[a]
31	87%[a]	83%[a]	86%[a]
32	96%[a]	100%[a]	90%
33	61%	64%	-
34	0%	1%	-
35	100%	100%	100%
36	100%	100%[a]	100%[a]
37	46%	42%	60%
38	72%	80%[a]	98%[a]
39	44%	47%	46%
40	97%[a]	78%[a]	86%[a]
41	100%[a]	100%[a]	100%[a]

TABLE 2 (Continued)

Generalization	Clymer 1963 Primary	Emans 1967 Beyond Primary	Bieri 1976 College
42	73%	40%	36%
43	57%	70%	72%
44	76%[a]	83%	100%
45	95%[a]	96%[a]	95%[a]

[a]Generalizations which met the original criteria of 75% utility and 20 occurrences.

found "useful" in Clymer's (1963) study, but were not found to meet the criteria in the present college study. By use of Table 2 and Table 3, which shows the number of words that each generalization applied to in each study, the following results were seen. Generalizations 25, 29, and 44 affected only two words each while having 100% utility. Generalization 32 only occurred in 10 words with 90% utility. Generalization 8 occurred in six words with 66% utility while generalization 10 occurred in two words with 50% utility. The only generalization that applied to a sufficient number of words to meet the criteria was generalization 21 which affected 51 words but only a utility level of 17%. The present study found generalizations 2, 36, and 38 met the criteria for "usefulness," while in Clymer's (1963) primary study he found that they did not. Clymer found a sufficient number of words for both generalization 2, which had 657 words, and 38, which had 563 words, but they had percentages of utility of 62% for the former and 73% for the latter. Generalization 36 only applied to five words with 100% in Clymer's (1963) primary study. Generalizations 8 and 32 met the criteria of "usefulness" in Emans' (1967) beyond primary study, but as mentioned above did not in the present study. Generalization 2 applied to a sufficient number of words in Emans'

TABLE 3

TOTAL NUMBER OF WORDS THAT EACH GENERALIZATION APPLIES TO FOR EACH VOCABULARY LEVEL FROM PRIMARY TO COLLEGE

Generalization	Clymer (1963)	Emans (1967)	Bieri (1976)
1	689	480	436
2	657	139	25
3	31	3	0
4	288	59	25
5	618	558	438
6	271	93	55
7	47	22	12
8	87	24	6
9	272	198	158
10	46	6	2
11	31	3	2
12	47	18	2
13	26	7	0
14	85	18	2
15	125	26	2
16	201	270	188
17	199	326	261
18	126	113	118
19	10	2	0
20	103	53	51

TABLE 3 (Continued)

Generalization	Clymer (1963)	Emans (1967)	Bieri (1976)
21	104	52	51
22	69	88	107
23	143	151	143
24	77	75	58
25	30	3	2
26	10	3	0
27	8	4	0
28	337	300	148
29	46	9	2
30	971	530	328
31	99	215	135
32	105	57	10
33	903	1490	-
34	157	269	-
35	4	6	6
36	5	85	60
37	114	227	182
38	563	811	100
39	427	659	653
40	64	68	61

TABLE 3 (Continued)

Generalization	Clymer (1963)	Emans (1967)	Bieri (1976)
41	30	44	33
42	73	91	75
43	755	136	22
44	112	18	2
45	197	172	66

(1967) study, but only had a utility level of 73%. Fourteen phonic generalizations (5, 16, 20, 22, 23, 24, 28, 30, 31, 36, 38, 40, 41, 45) were designated as "useful" at both the beyond primary level and at the college level.

Comparison of Generalizations that Meet a Lowered Percentage of Utility (60%) from Primary to College

Table 4 identifies the additional phonic generalizations that met the lowered percentage of utility (60%) and had at least 20 occurrences for each generalization. Due to the lowered percentage (60%), three more generalizations were identified as "useful" for all three levels examined. Generalizations 2, 24, and 38 then met the criteria of "usefulness." The greatest increase in phonic generalizations had met the new criteria occurred for Clymer's (1963) study. By use of Tables 3 and 4 we found that for Clymer's (1963) study, generalizations 2 (257 words), 3 (31 words), 4 (288 words), 6 (271 words), 9 (272 words), 11 (31 words), 24 (77 words), 38 (563 words), and 42 (73 words) met the lowered percentage of utility. Table 3 shows that for Emans' (1967) study, generalizations 2 (139 words), 4 (59 words), 21 (52 words), and 43 (136 words) then met the revised criteria. In the present study, the increase was in

TABLE 4

COMPARISON OF THE UTILITY LEVEL OF PHONIC GENERALIZATIONS FROM PRIMARY TO COLLEGE LEVEL WITH IDENTIFICATION OF THOSE MEETING ESTABLISHED CRITERIA OF USEFULNESS

Generalization	Clymer 1963 Primary	Emans 1967 Beyond Primary	Bieri 1976 College
1	45%	18%	6%
2	62%[b]	73%[b]	80%[a]
3	74%[b]	33%	0%
4	63%[b]	63%[b]	56%
5	78%[a]	82%[a]	78%[a]
6	66%[b]	58%	29%
7	17%	23%	30%
8	98%[a]	100%[a]	66%
9	60%[b]	48%	66%[b]
10	78%[a]	100%	50%
11	71%[b]	100%	100%
12	32%	28%	0%
13	35%	14%	0%
14	59%	50%	50%
15	40%	31%	50%
16	84%[a]	98%[a]	98%[a]
17	15%	4%	25%
18	48%	24%	27%
19	90%	100%	0%
20	100%[a]	100%[a]	98%[a]

TABLE 4 (Continued)

Generalization	Clymer 1963 Primary	Emans 1967 Beyond Primary	Bieri 1976 College
21	95%[a]	67%[b]	17%
22	96%[a]	90%[a]	87%[a]
23	100%[a]	100%[a]	100%[a]
24	64%[b]	80%[a]	93%[a]
25	100%[a]	100%	100%
26	100%	100%	0%
27	100%	100%	0%
28	99%[a]	91%[a]	95%[a]
29	100%[a]	100%	100%
30	85%[a]	75%[a]	76%[a]
31	87%[a]	83%[a]	86%[a]
32	96%[a]	100%[a]	90%
33	61%	64%	-
34	0%	1%	-
35	100%	100%[a]	100%
36	100%	100%[a]	100%[a]
37	46%	42%	60%[b]
38	72%[b]	80%[a]	98%[a]
39	44%	47%	46%
40	97%[a]	78%[a]	86%[a]
41	100%[a]	100%[a]	100%[a]

TABLE 4 (Continued)

Generalization	Clymer 1963 Primary	Emans 1967 Beyond Primary	Bieri 1976 College
42	73%[b]	40%	36%
43	57%	70%[b]	72%[b]
44	76%[a]	83%	100%
45	95%[a]	96%[a]	95%[a]

[a]Generalizations which met the original criteria of 75% utility and 20 occurrences.

[b]Generalizations which met the lowered percentage of 60% and 20 occurrences in the study.

generalizations 9, 37, and 43 being considered "useful." From Table 3, we found that generalization 9 applied to 158 words, generalization 37 to 182 words and generalizations 43 to 22 words.

Effect of Greek and Latin Roots or Prefixes and Their Specific Pronunciation on Phonic Generalizations

The specific pronunciation of a list of Greek and Latin roots and prefixes was applied to words which were the exceptions to the generalizations under study. Table 5 illustrates the percentage gain for certain phonic generalizations to which the word parts could apply. Generalization 1 increased from 6% to 18%. Generalization 5 increased from 78% to 81%. Generalization 6 increased from 29% to 34%. Generalization 17 changed from 25% to 30%. Generalization 18 moved up from 27% to 31%. Generalization 21 increased the greatest amount from 17% to 58%. Generalization 28 moved from 95% to 56%. The final generalization to be affected was generalization 42 which increased from 36% to 41%. These increases were not sufficient to allow another generalization to meet the established original criteria of "usefulness."

TABLE 5

COMPARISON OF THE UTILITY OF PHONIC GENERALIZATIONS USED BY THEMSELVES AND WHEN USED WITH A SPECIFIC PRONUNCIATION FOR WORDS WITH GREEK OR LATIN ROOTS OR PREFIXES

Generalization	Percent of Utility Bieri 1976	Percent of Utility After Specific Pronunciation Applied
1	6	18
5	78	81
6	29	34
9	66	67
17	25	30
18	27	31
21	17	58
28	95	97
39	46	56
42	36	41

Results of Equalizing the Length of the College Level Study to that of the Primary Level Study

In order to examine the final condition that the number of words in the vocabulary sample might prevent enough occurrences of the generalization to meet the original criteria, frequency of occurrence percentages were calculated, as seen in Table 6, and they were applied to the same number of words that occurred in Clymer's (1963) study (2600). After multiplying each percentage times the number in the initial study (Clymer, 1963), the projected number of word occurrences for each generalization was derived. The original utility percentages from Table 1 along with the projected number from Table 6 identified no new generalizations that would have met the original criteria.

Discussion

The discussion of the results includes comments on the data concerning the differences in the utility of phonic generalizations observed from primary to the college level, the effect of lowering the percentage of utility used, the influences of word parts with specific pronunciation on the college level results and the limitation due to the size of the study.

TABLE 6

FREQUENCY OF OCCURRENCE OF EACH PHONIC GENERALIZATION IN COLLEGE LEVEL VOCABULARY SAMPLE AND PROJECTED NUMBER OF WORDS OCCURRING IF THE STUDY CONTAINED THE SAME NUMBER OF WORDS THAT CLYMER USED (2600)

Generalization	Percent of Total	Percent Times 2600 Words
1	29.2	759
2[a]	1.6	41
3	0	0
4	1.6	41
5[a]	29.3	761
6	3.6	93
7	.8	20
8	.4	10
9	10.5	273
10	.1	2
11	.1	2
12	.1	2
13	0	0
14	.1	2
15	.1	2
16[a]	12.5	325
17	17.4	452
18	7.8	202
19	0	0
20[a]	3.4	88
21	3.4	88
22[a]	7.1	184
23[a]	9.5	247
24[a]	3.8	98
25	.1	2
26	0	0
27	0	0
28[a]	9.8	254

TABLE 6 (Continued)

Generalization	Percent of Total	Percent Times 2600 Words
29	.1	2
30[a]	21.9	569
31[a]	9.0	234
32	.6	15
33	-	-
34	-	-
35	.4	10
36[a]	4.0	104
37	12.1	312
38[a]	6.6	171
39	43.6	1133
40[a]	4.0	104
41[a]	2.2	57
42	5.0	130
43	1.4	36
44	.1	2
45[a]	4.4	114

[a]Generalizations which met the original criteria of 75% utility and 20 occurrences.

Utility of Phonic Generalizations

The results of the first part of the study show that 15 of Clymer's original generalizations met the specific criteria and were considered "useful" at the college level. Eleven of these generalizations were the same ones that Clymer found to be "useful" in his study at the primary level. Four other generalizations were found to be "useful" at the college level which were not labeled "useful" at the primary level. These results show that fewer phonic generalizations can be considered "useful" at the college level than at the primary level. These 11 generalizations all contain a rather large number of occurrences. This seems in agreement with Burmeister's (1968) views on the unimportance of the source for the vocabulary sample.

The seven out of Clymer's original 18 generalizations that do not have utility at the college level are important to examine. Three of the generalizations had only two words each that contained the letter combination being studied. They had 100% utility, but the study would have had to be at least 10 times as large in order to have sufficient occurrences to satisfy the original criteria.

Two other generalizations had too few words and too low a level of utility to meet the criteria. One other generalization had 10 words occurring and

90% utility and this generalization could conceivably have "usefulness" if the study had been larger.

The only generalization of the seven that worked for Clymer in his study but not in the present study that had sufficient number of words is number 21, which is concerned with ch making the sound as in chair. This seems to identify certain phonic generalizations which do not occur with sufficient frequency to necessitate using them in remedial instruction.

The four generalizations that have "usefulness" at the college level and not at the primary level are also important to analyze. Two of the four (generalizations 2 and 36) were related to the fact that the college study contained more polysyllabic words as opposed to monosyllabic words. Generalization 2 applied to 25 words and had a utility level of 80% in the college study while it applied to 657 words and had a utility level of 62% in the primary study. This generalization stated that the vowel sound in the middle of a one syllable word was short. There are many fewer one syllable words at the college level, but they seemed to follow the rule with greater reliability. Generalization 36 (tion as a final syllable is unaccented) occurred in 60 words and had a utility level of 100% at the college level while only appearing five times with 100% utility at the

primary level. This generalization seemed worth noting due to its 100% applicability at all three levels.

The two other generalizations that proved "useful" at the college level were numbers 24 which had 93% and 58 words and 38 which had 98% and 100 words. Clymer found generalization 24 to have 64% utility and 77 words while generalization 38 had 72% utility and 563 words. There does not appear to be a great enough difference between these figures to state that the generalization 38 was more "useful" at the college level than at the primary level. Generalization 24 became "useful" at the beyond primary level in Emans' (1967) study and continued that way at the college level.

The only differences in results between Emans' (1967) beyond primary study and the present college level study was in generalizations 2, 8 and 32. Generalization 8 was described previously as only having six words and 66% utility in the college level study, while it applied to 24 words with 100% utility in Emans' (1967) study. Generalization 32 which was also described earlier as having only 10 words and 90% utility in the present study, applied to 57 words with 100% utility in Emans' (1967) study. Generalization 2 which had 25 words and 80% utility in the present study had 139 words and 73% utility in Emans' (1967) study. These differences were too small to say

that the generalizations 2, 8, and 32 were more or less "useful" at the college level than at a beyond the primary level.

Fourteen of the 16 generalizations that Emans found "useful" at the beyond the primary level are still considered "useful" at the college level. This is a much greater degree of agreement between the present study and Emans' (1967) study than between Emans' (1967) or Clymer's (1963) or between the present study and Clymer's (1963) study. The present study tends to reinforce Emans' findings in regard to which phonic generalizations are valid beyond the primary level vocabulary.

Lowering the Utility Level

The idea that 75% utility was the precise cut-off point in determining "usefulness" has been questioned by other researchers (Emans, 1967 and Clymer, 1963). The arbitrary choice of 60% utility level as a new requirement along with 20 occurrences of the generalization was developed because too strict a standard might have limited much information. When looking at the results, the utility level of Clymer's results increased to nine more generalizations that had utility in percentage and enough words in application to be termed "useful." Emans picks up four more

generalizations while three more were added in this study of "useful" generalizations.

The degree of utility of a generalization is a function of the percent used for a cut-off point. For example, a generalization with 98% utility that would affect only 20 words should not be considered more valuable than a generalization affecting 560 words with a 73% utility.

Greek and Latin Roots and Prefixes

The results of the application of a specific pronunciation for word parts (Greek and Latin roots and prefixes) in conjunction with the generalization being used did not appreciably change any of the utility percentages enough to have them meet the criteria. Since the book being studied (Programed College Vocabulary 3600) introduced them in two separate chapters as forming the basis of many of our words, it was expected that knowledge of their pronunciation might alter the utility percentage in favor of creating more generalizations being labeled "useful." An examination of the pronunciation of the specific word parts was performed in order to determine if the larger word would meet the guidelines for the specific generalizations if pronunciation of the word part was known. The results indicated that

Davis (1972) seemed to be correct in her feelings about phonetic regularity on the inner syllables of multisyllabic words.

Size of the Study

The frequency of occurrence table was calculated in order to determine how large a part of the vocabulary chosen was applicable to each generalization. Since the college sample was smaller than the other two being compared, the sample size was prorated in order to obtain a more equal comparison. By multiplying the frequency of occurrence in the present study by the number of wor in Clymer's (primary study), it was possible to determine the projected number of words that would occur in each generalization. The larger number of words and the accompanying percentage of utility was then examined to see if any new generalizations then had the sufficient number of words to have met the original criteria. No new generalizations occurred having the sufficient utility and number of words needed to be labeled "useful." The sample would have had to be many times greater in size to have some of the present study's generalizations, which only had two words and 100% utility, meet the required criteria.

The close agreement between the results that Emans achieved and the results in the present study seem to indicate that the vocabulary sampled is very similar in nature. On examination, the results showed that 14 of Emans' "useful" generalizations are also labeled "useful" at the college level, while the 15th "useful" generalization had 73% utility and a sufficient number of words to meet the criteria in Emans' (1967) study. The differences between the present study and Clymer's (1963) study, as shown in the results, are centered on the infrequency of occurrence of some of the generalizations in a college level vocabulary. These generalizations are focused on letter and sound combinations that seem to occur more frequently in a primary level vocabulary sample than in a college level vocabulary sample.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

A purpose of this study was to discover similarities between the percentages of utility of a group of phonic generalizations applied to a college level vocabulary sample, a primary level vocabulary sample, and a beyond primary level vocabulary sample. The analysis also considered the effect of changing the cut-off point from 75% to 60% and the effect of prorating the length of the study and its comparability to other studies.

Another purpose of the study was to determine if there were qualitative differences in the types of phonic generalizations that have utility at different vocabulary levels. Word parts, with their specific pronunciation, and phonic generalizations were then analyzed to determine if there was a relationship present.

The following results were found:

1. Fifteen of Clymer's phonic generalizations were found to have met the original criteria for "usefulness," which was that the generalization apply

to at least 20 words and that it predict the pronunciation of the word at least 75% of the time.

2. Seven of Clymer's generalizations that were "useful" at the primary level were not found to be "useful" at the college level.

3. Two of Emans' generalizations that were "useful" at the beyond primary level were not found to be "useful" at the college level.

4. Four of the 15 that were found "useful" at the college level were not identified as "useful" at the primary level. Fourteen of these 15 were also found "useful" at the beyond primary level.

5. Lowering the percentage of utility to 60% produced three more phonic generalizations that met the criteria of "usefulness" at the college level.

6. In projecting the number of words that would have appeared for each generalization if the present study was as long as Clymer's original study, it was discovered that no new generalizations would meet the criteria for "usefulness."

7. The application of a specific pronunciation for parts of words containing Greek or Latin roots and prefixes did not cause a sufficient change in the percentage of utility of any generalization to have it meet the criteria of "usefulness."

Conclusions

Phonic generalizations had a lower degree of utility when applied to a college level vocabulary sample than when applied to a primary level vocabulary sample. However, when phonic generalizations were applied to a college level vocabulary sample and a beyond primary level vocabulary sample they demonstrated similar degree of utility.

Qualitatively, the difference between this study and Clymer's (1963) study essentially an insufficient number of words occurring in this study to which certain phonic generalizations could be applied as compared to Clymer's (1963) study. The small difference between this study and Emans' (1967) study was in one phonic generalization which had a high enough percentage of utility but an insufficient number of occurrences.

Needed Research

Further research appears to be needed in the following areas:

1. The percentage of utility and the number of words to which it applies should both be analyzed when creating standards of "usefulness."

2. The effect of word parts such as prefixes and suffixes (which were not studied here) on phonic

generalizations.

3. The construction of new testing measures should be undertaken to identify knowledge of the phonic generalizations which are "useful" at the various levels.

4. Efforts should be made to identify the actual word recognition processes and how much information must the student actually get from the phonic generalization in conjunction with the context to figure out the unknown word.

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APPENDIX A

SUPPLEMENTARY FIGURES

PHONIC GENERALIZATIONS BY THEODORE CLYMER 1963

Generalizations
1. When there are two vowels side by side, the long sound of the first one is heard and the second is usually silent.
2. When a vowel is in the middle of a one-syllable word, the vowel is short.
3. If the only vowel letter is at the end of a word, the letter usually stands for a long sound.
4. When there are two vowel sounds, one of which is final e, the first vowel is long and the e is silent.
5. The r gives the preceding vowel a sound that is neither long nor short.
6. The first vowel is usually long and the second silent in the digraphs ai, ea, oa, and ui.
7. In the phonogram ie, the i is silent and the e has a long sound.
8. Words having double e usually have a long e sound.
9. When words end with silent e, the preceding a or i is long.
10. In ay the y is silent and give a its long sound.
11. When the letter i is followed by the letters gh, the i usually stands for its long sound and the gh is silent.
12. When a follows w in a word, it usually has the sound a as in was.
13. When e is followed by w, the vowel sound is the same as represented by oo.
14. The two letters ow make the long o sound.
15. TV is sometimes a vowel and follows the vowel digraph rule.

Generalizations

16. When y is the final letter in a word, it usually has a vowel sound.

17. When y is used as a vowel in words, it sometimes has the sound of long i.

18. The letter a has the same sound (o) when followed by l, w, and u.

19. When a is followed by r and final e, we expect to hear the sound heard in care.

20. When c and h are next to each other, they make only one sound.

21. Ch is usually pronounced as it is in kitchen, catch, and chair, not like sh.

22. When c is followed by e or i, the sound of s ia likely to be heard.

23. When the letter c is followed by o or a the sound of k is likely to be heard.

24. The letter g often has a sound similar to that of j in jump when it precedes the letter i or e.

25. When ght is seen in a word, gh is silent.

26. When a word begins kn, the k is silent.

27. When a word begins with wr, the w is silent.

28. When two of the same consonants are side by side only one is heard.

29. When a word ends in ck, it has the same last sound as in look.

30. In most two-syllable words, the first syllable is accented.

31. If a, in, re, ex, or be is the first syllable in a word, it is usually unaccented.

Generalizations

32. In most two-syllable words that end in a consonant followed by y, the first syllable is accented and the last is unaccented.

33. One vowel letter in an accented syllable has its short sound.

34. When y or ey is seen in the last syllable that is not accented, the long sound of e is heard.

35. When ture is the final syllable in a word, it is unaccented.

36. When tion is the final syllable in a word, it is unaccented.

37. In many two- and three-syllable words, the final e lengthens the vowel in the last syllable.

38. If the first vowel sound in a word is followed by two consonants, the first syllable usually ends with the first of the two consonants.

39. If the first vowel sound in a word is followed by a single consonant, that consonant usually begins the second syllable.

40. If the last syllable of a word ends in le, the consonant preceding the le usually begins the last syllable.

41. When the first vowel element in a word is followed by th, ch, or sh, these symbols are not broken when the word is divided into syllables and may go with either the first or second syllable.

42. In a word of more than one syllable, the letter v usually goes with the preceding vowel to form a syllable.

43. When a word has only one vowel letter, the vowel sound is likely to be short.

Generalizations
44. When there is one e in a word that ends in a consonant, the e usually has a short sound.
45. When the last syllable is the sound r, it is unaccented.

LATIN AND GREEK DERIVATIVES

Latin Roots	Latin Prefixes	Greek Roots	Greek Prefixes
am, amat	ante	anthrop	amphi
ann, enn	bi	astr	anti
aqu	circum	auto	arch
aud, audit	contra	bibli	dia
capit	inter	bio	epi
cent	intra, intro	chrom	eu
cred, credit	multi	chron	hyper
dic, dict	post	crypt	hypo
duc, duct	pre	cycl	kilo
fid	retro	dec	meta
frater	semi	dem	mono
greg	sub	derm	neo
litera	super	dyn	peri

Latin Roots	Latin Prefixes	Greek Roots	Greek Prefixes
loc	trans	gram, graph	poly
loqu, locut	uni	hetero	syn, sym
mal		homo	
man		hydr	
mater, matr, metr		log	
mit, miss		metr, meter	
mor, mort		morph	
mov, mot, mob		neur	
nov		orth	
omni		paleo	
ped		pan	
pon, posit		path	
port, portat		phil	
scrib, script		phon	

Latin Roots	Latin Prefixes	Greek Roots	Greek Prefixes
sign		physi	
spec, spect		pseudo	
spir, spirat		psych	
tempor		pyr	
terra		soph	
urb		tele	
vid, vis		the	
voc, vocat		therm	